MOTION IN A PLANE

SET 1 – MCQs (Motion in a Plane)

Q1. Which of the following is a scalar quantity?
a) Velocity
b) Acceleration
c) Force
d) Temperature
Ans: d

Q2. A vector quantity has –
a) Only magnitude
b) Only direction
c) Both magnitude and direction
d) Neither magnitude nor direction
Ans: c

Q3. Which of the following is **not** a vector?
a) Displacement
b) Momentum
c) Work
d) Force
Ans: c

Q4. A scalar can be added to another scalar –
a) Only if units are same
b) Even if units differ
c) Only if direction is same
d) Only if magnitude is same
Ans: a

Q5. The SI unit of displacement is –
a) m
b) m/s
c) m/s^2
d) radian
Ans: a

Q6. Two vectors are equal if –
a) They have same magnitude only
b) They have same direction only
c) They have same magnitude and direction
d) Their product is same
Ans: c

Q7. Multiplying a vector by –1 gives –
a) Same vector
b) Opposite vector
c) Null vector
d) Unit vector
Ans: b

Q8. The sum of a vector and its negative is –
a) Zero vector
b) Unit vector
c) Scalar
d) Undefined
Ans: a

Q9. In triangle law of vector addition, the third side represents –
a) Difference of vectors
b) Product of vectors
c) Resultant of vectors
d) Unit vector
Ans: c

Q10. Vector addition is –
a) Not commutative
b) Commutative
c) Sometimes commutative
d) Never associative
Ans: b

Q11. A vector can be resolved into components –
a) Only along x-axis
b) Only along y-axis
c) Along any two non-parallel directions
d) Along the resultant direction
Ans: c

Q12. The x-component of vector A making angle θ with x-axis is –
a) A cos θ
b) A sin θ
c) A tan θ
d) A cot θ
Ans: a

Q13. If vector A = 3î + 4ĵ, its magnitude is –
a) 5
b) 7
c) 12
d) 25
Ans: a

Q14. The unit vector along y-axis is –
a) $\hat{i}$
b) $\hat{j}$
c) $\hat{k}$
d) Zero vector
Ans: b

Q15. Which one is a unit vector?
a) $2\hat{i}$
b) $3\hat{j}$
c) $\hat{i} + \hat{j}$
d) $\hat{i}/\sqrt{1}$
Ans: d

Q16. If $A = 2\hat{i} + 3\hat{j}$, $B = 4\hat{i} - \hat{j}$, then $Ax + Bx = ?$
a) 2
b) 4
c) 6
d) 8
Ans: c

Q17. The angle between $\hat{i}$ and $\hat{j}$ is –
a) 0°
b) 45°
c) 90°
d) 180°
Ans: c

Q18. A vector A has components Ax = 12, Ay = 5. Its magnitude is –
a) 12
b) 13
c) 17
d) 144
Ans: b

Q19. Which law is used in analytical method of vector addition?
a) Law of sines
b) Law of cosines
c) Both (a) and (b)
d) None
Ans: b

Q20. A particle is acted upon by two forces F1 and F2 simultaneously. Their resultant depends on –
a) Magnitudes only
b) Directions only
c) Magnitudes and directions both
d) None
Ans: c

Q21. The position vector r = xi + yj. Here x and y are –
a) Scalars
b) Vectors
c) Both
d) None
Ans: a

Q22. The average velocity is displacement divided by –
a) Distance
b) Time interval
c) Speed
d) Acceleration
Ans: b

Q23. The velocity of a particle is always –
a) Along displacement
b) Along tangent to path
c) Towards centre
d) Away from centre
Ans: b

Q24. The instantaneous acceleration is –
a) dv/dt
b) dr/dt
c) dx/dt
d) None
Ans: a

Q25. For motion in 2D, velocity and acceleration vectors can have angle –
a) Only 0°
b) Only 180°
c) Between 0° and 180°
d) Cannot say
Ans: c

Q26. Equation of velocity in 2D under constant acceleration is –
a) $v = v_0 + at$
b) $v = u + gt$
c) $v = s/t$
d) $v = v_0 – gt$
Ans: a

Q27. In x-y plane, under constant acceleration ax, ay – position is given by –
a) $x = v_{0x} t + \frac{1}{2} a_x t^2$, $y = v_{0y} t + \frac{1}{2} a_y t^2$
b) $x = v_{0y} t + \frac{1}{2} a_y t^2$, $y = v_{0x} t + \frac{1}{2} a_x t^2$
c) $x = v_0 t + at^2$, $y = 0$
d) None
Ans: a

Q28. A particle moves with constant acceleration. Its trajectory is –
a) Linear
b) Circular
c) Parabolic
d) Random
Ans: c

Q29. In projectile motion, horizontal motion is –
a) Uniformly accelerated
b) Uniform
c) Retarded
d) Oscillatory
Ans: b

Q30. Vertical motion of projectile is –
a) Uniform
b) Uniformly accelerated
c) Circular
d) None
Ans: b

Q31. The path of a projectile is –
a) Circle
b) Ellipse
c) Parabola
d) Hyperbola
Ans: c

Q32. In projectile, horizontal component of velocity remains –
a) Constant
b) Decreasing
c) Increasing
d) Zero
Ans: a

Q33. Time of flight = ?
a) $(2\ v_0 \sin\theta)/g$
b) $(v_0 \cos\theta)/g$
c) $(v_0 \sin\theta)/g$
d) $(2\ v_0 \cos\theta)/g$
Ans: a

Q34. Maximum height = ?
a) $(v_0^2 \cos^2\theta)/2g$
b) $(v_0^2 \sin^2\theta)/2g$
c) $(v_0^2 \sin^2\theta)/g$
d) $(v_0^2 \cos^2\theta)/g$
Ans: b

Q35. Horizontal range = ?
a) v_0^2/g
b) $v_0^2 \sin 2\theta/g$
c) $v_0^2 \cos^2 \theta/g$
d) $v_0^2 \tan \theta/g$
Ans: b

Q36. The range is maximum when angle of projection is –
a) 30°
b) 45°
c) 60°
d) 90°
Ans: b

Q37. At maximum height, vertical velocity is –
a) g
b) 0
c) v0
d) v0 cos θ
Ans: b

Q38. The horizontal velocity of projectile at top is –
a) 0
b) v0
c) v0 cos θ
d) v0 sin θ
Ans: c

Q39. If two complementary angles are used, ranges are –
a) Different
b) Same
c) Zero
d) Infinite
Ans: b

Q40. The trajectory of a projectile is symmetric about –
a) Time axis
b) Vertical axis
c) Line of projection
d) Highest point
Ans: b

Q41. In uniform circular motion, speed is –
a) Variable
b) Constant
c) Zero
d) Infinite
Ans: b

Q42. In UCM, acceleration is directed –
a) Along tangent
b) Away from centre
c) Towards centre
d) Along velocity
Ans: c

Q43. Centripetal acceleration = ?
a) v^2/R
b) vR
c) R/v^2
d) gR
Ans: a

Q44. Angular speed ω = ?
a) v/R
b) vR
c) R/v
d) v^2/R
Ans: a

Q45. Linear speed v = ?
a) $R\omega$
b) ω/R
c) ω^2R
d) None
Ans: a

Q46. If T is time period, angular speed = ?
a) $2\pi/T$
b) $T/2\pi$
c) $1/T$
d) $2T/\pi$
Ans: a

Q47. Centripetal acceleration in terms of frequency v = ?
a) $2\pi vR$
b) $4\pi^2v^2R$
c) $2\pi R/v$
d) None
Ans: b

Q48. In UCM, velocity is –
a) Constant vector
b) Changing vector
c) Zero vector
d) Infinite vector
Ans: b

Q49. In UCM, acceleration vector is –
a) Constant in magnitude and direction
b) Constant in magnitude but changing in direction
c) Zero
d) Increasing
Ans: b

Q50. The motion of hands of a clock is –
a) UCM
b) Projectile
c) Rectilinear
d) None
Ans: a